February 9, 2011

ATTACHMENT A
STATEMENT OF WORK

AIRCRAFT ISOLATION SYSTEM FOR GROUND VIBRATION TESTING

1. INTRODUCTION

Acquiring aircraft modes accurately is a crucial step in a validating a structural finite element model that leads directly into the accuracy of flight flutter predictions. A ground vibration test is the common way to obtain these modes and the ideal boundary conditions to use during this test is a free-free condition simulating an aircraft floating in air. A system is required to simulate this free-free boundary condition as closely as possible with the constraints involved. The aircraft has only under wing jack points as a boundary condition interface and the allowable space available is tight due to the proximity of the landing gear and wing stores. The system must act as a regular aircraft jack when the isolation system is inactive, allowing for the aircraft to safely rest on the system when not testing.

2. SCOPE OF WORK

The Contractor shall design, manufacture, and test this isolation system with the input of DFRC personnel.

The following objectives shall be accomplished as a result of this effort:

1. Provide adequate isolation to the aircraft for two weight configurations: light and heavy.
2. Fit within the design envelope and maintain the required height when the isolator is inactive.
3. The system must come in an “off-the-shelf” package documenting maintenance, operational requirements, and certification of design, inspection, or test.

3. DESIGN REQUIREMENTS

The contract deliverables developed under this contract such as documentation shall be in a format compatible with Adobe Reader.

These requirements refer to an aircraft isolation system consisting of three (3) isolators: one (1) “Small Isolator” and two (2) “Large Isolators”.

1) All isolators must contain a vertical frequency range of 0.4-0.6Hz and a horizontal frequency range of 0.4-0.8 within the operation load ranges specified.

2) All isolators must meet the required isolation frequency ranges with vertical load ranges specified below:
   a) Small Isolator: load range of 1,000-2,000lb.
   b) Large Isolators: load range of 5,000-13,000lb.

3) All isolators must be designed to a minimum Safety Factor of three (3) with positive margins of safety to meet these minimum requirements:
   a) Small Isolator: vertical load of 3,500-lb, lateral load of 200-lb.
   b) Large Isolator: Vertical load of 14,000-lb, lateral load of 2,000lb.

4) Analysis to be included in design safety factors include at a minimum:
   a) Stress analysis.
   b) Dynamic analysis of the support structure in the event of isolator failure
      i) Drop distance in event of isolator failure not to exceed 1 inch.

5) All electrical components must meet NFPA Code 70, Article 513 for Class 1 Division 2 group D areas.

6) System must work on standard shop quality compressed air. Any requirement for clean, dry air must be met by a properly designed contractor supplied filter.

7) Compressed air vessel must meet ASME Code Section 8 Division 1 standards, shall be ASME Section VIII code stamped.

8) Pressure test must be performed to above the maximum working pressure and the results must be reported (including but not limited to: duration pressurized and pressure, and procedures)

9) Maintenance requirements for the system must be specified including but not limited to:
   a) Service life of parts
   b) Calibration requirements
   c) Valve testing requirements,
   d) Storage requirements and recommendations
   e) Any recommended periodic testing

10) All single point failure of the system must be documented and understood by DFRC personnel at design review. Changes after design review require an additional meeting. It is preferred that all single-point failures are designed out of the system.

11) All flow rate and source pressure requirements are documented and presented at the design review.

12) Material properties of all tank components are specified and an epoxy paint coating inside the tank to reduce corrosion is used.

13) Isolators shall be mobile when not under load but contain a method for locking into position before loading.

14) Certification that internal welds of the pressure tank were inspected per ASME standards.

15) Isolators must interface with a standard aircraft jack cup which has a 1 inch diameter pin with a 1 inch shaft length.

16) Delivery of isolators shall be 10 weeks after the design is approved by DFRC. Delivery paid in full by contractor.

17) Height and Size requirements:

    a) All isolators must have an adjustable shaft allowing for a minimum of 5 inches of adjustment.

    b) Two large isolators must be 60 inches high, measured from the aircraft cup interface point. The isolators must fit within a 16inch radius from the connection point. Two consecutive sides of this circle may exceed this boundary and system must be free to rotate during setup.

    c) One small isolator must be 55 inches high, measured from the aircraft cup interface point. The isolators must fit within a 4inch radius from the connection point. Two consecutive sides of this circle may exceed this boundary and system must be free to rotate during setup.